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open in the same direction as the required doors. Decorative doors must not be used in stairways or stairtowers.

[CGD 85–080, 61 FR 900, Jan. 10, 1996, as amended at 62 FR 51350, Sept. 30, 1997]

§ 116.438 Stairtowers, stairways, ladders, and elevators.

(a) A vessel carrying more than 600 passengers or with overnight accommodations for more than 49 passengers must meet the requirements for stairways, ladders, and elevators in § 72.05–20 of this chapter.

(b) *Materials.* (1) Stairways, stairtowers, ladders, elevators, and landings must be designed with sufficient strength to sustain a load of 4.8 kPa (100 pounds per square foot) with a safety factor of 4, based on ultimate strength of the material;

(2) All stairways, ladders, elevators, and landings within machinery spaces and cargo holds must be composed of steel; and

(3) All stringers, treads, and all platforms and landings of all stairways shall be composed of steel, and risers must be of approved incombustible material, except that:

(i) Stairways, ladders, elevators, stringers, treads, platforms, and landings protected from potential fire exposure by being in either exterior locations or within protective enclosure bulkheads, decks and doors as described in the requirements of paragraph (j), may be constructed of approved incombustible material; and

(ii) All stairways, ladders, elevators, stringers, treads, platforms, and landings subject to potential fire exposure and not within a protective enclosure must be composed of steel unless their failure will not hinder fire fighter access or debarkation.

(c) A stairway or stairtower must be fitted with handrails on both sides at a vertical height above the tread at its nosing of between 840 and 910 millimeters (33 and 36 inches). A stairway or stairtower of more than 1,680 millimeters (66 inches) in width must also be fitted with a center handrail.

(d) A handrail fitted in a stairtower, stairway, landing, ladder, or elevator must be constructed of noncombustible material.

(e) A stairway or stairtower must be clear of all obstructions other than handrails.

(f) Curved, spiral, or winding stairways are permitted only with the specific approval of the Commandant.

(g) Differences in the depth of tread or height of riser of stairs in different flights of stairs in a stairway or stairtower must be minimized. In an individual flight of stairs in a stairway or stairtower, the depth of the tread and the height of riser shall not have a variance exceeding 5 millimeters (0.19685 inches).

(h) In a stairway or stairtower, the sum of the riser height and tread depth must be at least 432 millimeters (17 inches) and not more than 455 millimeters (18 inches). A stairway or stairtower having treads less than 254 millimeters (10 inches) in depth must have a nosing of 12.7 millimeters (0.5 inches) in width.

(i) Landings for stairways and stairtowers must meet the following requirements:

(1) A clear landing having an area at least equal to the square of the tread width must be provided at the top and bottom of each stairway; and

(2) Any interruption or change of direction in a stairway must be accomplished by means of an intermediate landing of a width and length at least equal to the tread width of the stairway.

(j) A stairway or stairtower must not have an angle of inclination from the horizontal of more than 40 degrees. However, stairways accessing spaces visited solely by crew members must not have an angle of inclination from the horizontal of more than 50 degrees. The Commanding Officer, Marine Safety Center may approve higher angles of inclination for spaces with severe space constraints.

(k) Where a continuous vertical deck penetration for a stairway or elevator exceeds one deck, the integrity of all decks must be assured by enclosure bulkheads and decks meeting the requirements of §§ 116.415(b) and 116.415(c) of this part. Doors meeting the requirements of §§ 116.435(b) and 116.435(c) of this part must be fitted in the enclosure at each deck serviced.

(l) Where a vertical deck penetration for a stairway or elevator involves only one deck, the integrity of the deck must be assured as required by paragraph (k) of this section. Alternatively the integrity of the deck may be maintained at one level only by means of bulkheads of the same fire control boundary rating as the deck penetrated. A door meeting the requirements of §§116.435(b) and 116.435(c) of this part must be fitted in the enclosure. In spaces containing a balcony, the integrity of the balcony deck in the way of stairways or elevators need not be assured. However, such stairways must not be considered to be a means of escape.

(m) *Arrangements.* (1) Each main vertical zone with more than two deck levels, each having enclosed or partially enclosed accommodation spaces, other than washroom or toilet spaces and open decks, must be served by at least one stairtower, so that a person may escape from any accommodation space or any other space where persons may be normally quartered or employed, to all other decks having any such spaces within the same main vertical zone, without coming out of the stairtower enclosure. Where a stairtower is accessible from two main vertical zones, it may be considered as the required stairtower for both main vertical zones provided all boundaries of the stairtower meet main vertical zone boundary requirements contained in §116.415 of this part.

(2) Each stairtower must give access to an embarkation station or an area of refuge identified in the emergency escape plan required by §116.520.

(3) Stairtowers must not give direct access to overnight accommodations or spaces of type 9, 10, 11, or 12.

(4) A stairtower is not required to extend below deck to serve spaces in which a fire is likely to originate if one of the means of escape is:

(i) A stairway that leads directly to a weather deck; or

(ii) A stairway leading to a stairtower enclosure that includes self closing fire doors at both the top and bottom; or

(iii) An alternative stairtower arrangement providing an equivalent level of safety is acceptable to the

Commanding Officer, Marine Safety Center.

(5) The Commanding Officer, Marine Safety Center may accept other means of escape in combination with a stairtower provided the exits open directly to weather or through a main vertical zone bulkhead.

(6) For vessels in which a stairtower is not required, a stairway must provide a means of escape for each deck of the main vertical zone.

(n) The minimum tread width of a stairway or stairtower must be 8.4 millimeters (0.333 inches) for each person served, but must not be less than 910 millimeters (36 inches). However, in stairways accessing spaces utilized solely by crew members, the minimum tread width must be 8.4 millimeters (0.333 inches) for each person served, but not less than 710 millimeters (28 inches).

(1) The minimum tread width of a stairway or stairtower must be determined for each deck considering only those persons on that deck, except as provided in paragraph (n)(3) of this section. Once a minimum tread width has been established at any deck, it must not be decreased in the direction of escape.

(2) In determining the number of persons served, a space must be considered to contain at least the number of persons as follows:

(i) Passenger overnight accommodation spaces: Designed capacity;

(ii) Accommodation spaces having fixed seating for passengers: Maximum seating capacity;

(iii) Public spaces, including spaces such as casinos, restaurants, club rooms, and cinemas, and public accommodation spaces as defined in §114.400 of this subchapter, except overnight accommodation spaces: One person for each 0.9 square meters (10 square feet) of deck area. In computing such deck area, the following areas must be excluded:

(A) Areas for which the number of persons permitted is determined using the fixed seating criterion;

(B) Obstructions, including stairway and elevator enclosures, elevated stages, bars, and cashier stands, but not including slot machines, tables, or other room furnishings;

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(C) Toilets and washrooms;

(D) Interior passageways less than 850 millimeters (34 inches) wide and passageways on open deck less than 710 millimeters (28 inches) wide;

(E) Spaces necessary for handling lifesaving equipment, anchor handling equipment, or line handling gear, or in way of sail booms or running rigging; and

(F) Bow pulpits, swimming platforms, and areas that do not have a solid deck, such as netting on multi hull vessels;

(iv) Crew overnight accommodation spaces: Two-thirds designed capacity; and

(v) Work spaces: Occupancy under normal operating conditions.

(3) If a stairway forms part of a normal embarkation or debarkation route, or egress route to an area of refuge, the number of persons using the stairway for that purpose must be used in determining the minimum tread width. The Commanding Officer, Marine Safety Center, may approve a narrower stairway width if a narrower stairway will not unreasonably impede the flow of persons out of the space requiring egress or from an area of refuge to an embarkation station. Specific consideration can be given by the Marine Safety Center to the arrangement of landing area in excess of that required by paragraph (i) of this section when considering the approval of a narrower stairway width. However, the stairway width must be at least 910 millimeters (36 inches) unless the stairway is utilized solely by crew members, in which case the minimum tread width must be at least 710 millimeters (28 inches).

(4) If more than one stairtower serves a main vertical zone, the number of persons in that main vertical zone may be distributed among the stairtowers.

[CGD 85–080, 61 FR 900, Jan. 10, 1996; 61 FR 20556, May 7, 1996, as amended at 62 FR 51350, Sept. 30, 1997; USCG 1998–4442, 63 FR 52191, Sept. 30, 1998; USCG–2002–13058, 67 FR 61729, Sept. 30, 2002; USCG–2004–18884, 69 FR 58348, Sept. 30, 2004]

§ 116.439 Balconies.

(a) An accommodation space containing a balcony must meet the requirements of this section.

(b) Each level of a space containing a balcony must have two independent means of escape that meet the requirements of § 116.500 of this part.

(c) For the purpose of main vertical zone bulkhead spacing requirements, the length of the space to which the balcony opens is considered to be increased by an amount equal to the gross area of the balcony divided by the average width of the space. If this equivalent main vertical zone length exceeds 40 meters (131 feet), the space must meet the requirements of paragraph (d) of this section. The actual length of the space may not exceed 40 meters (131 feet).

(d) If the equivalent main vertical zone length under paragraph (c) of this section exceeds 40 meters (131 feet), both decks connected by the balcony must be protected with an automatic sprinkler system meeting NFPA 13.

(e) If the unobstructed balcony opening area is less than 93 square meters (1,000 square feet), the opening must be protected in accordance with NFPA 13 or other standard specified by the Commandant. The horizontal projection area of stairs, escalators, statues, or other obstructions must be subtracted from the total balcony opening area for purposes of computation of unobstructed balcony opening area.

[CGD 85–080, 61 FR 900, Jan. 10, 1996, as amended at 62 FR 51350, Sept. 30, 1997; 62 FR 64305, Dec. 5, 1997]

§ 116.440 Atriums.

(a) The atrium opening area must be a minimum of 93 square meters (1000 square feet) or 20% of the gross deck area of the largest deck within the accommodation space containing the atrium, whichever is smaller.

(1) Each side of an atrium opening must be a minimum of 6.1 meters (20 feet) in length. If the opening is circular or ellipsoid, it must measure at least 6.1 meters (20 feet) across in any direction.

(2) Any deck opening within an atrium must fit wholly within the horizontal projection of any deck opening of an upper deck.

(3) The horizontal projection area of stairs, escalators, statues, etc. within the atrium shall not be included for